Aquagate Liquid Cooling System

Installation Guide

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Aquagate Liquid Cooling System, first edition February 2004

Disclaimer

This manual has been validated and reviewed for accuracy. The instructions and descriptions it contains are accurate for the Aquagate Liquid Cooling System at the time of this manual's production. However, succeeding devices and manuals are subject to change without notice. Cooler Master Co., Ltd. assumes no liability for damages incurred directly or indirectly from errors, omissions or discrepancies between the computer and the manual.

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About the Aquagate Liquid Cooling System

The Aquagate Liquid Cooling System is a revolutionary form of heat management for desktop computing platforms. It relies on a special liquid coolant to draw heat away from the CPU in order to keep it as cool as possible. It is designed to be extremely flexible, allowing you to install on an Intel Pentium® 4, AMD K7 (Duron, Athlon, AthlonMP, AthlonXP), or AMD K8 (Opteron, Athlon64), the three most popular processors on the market today. Enclosed in a durable aluminum case, the Aquagate Liquid Cooling System can be installed either inside your computer in a pair of spare drive bays, or outside it in the event your computer chassis is already too crowded to accommodate it.

About Cooler Master

Since the company's founding in 1992, Cooler Master has put much effort into the research and development, manufacturing and marketing of heat sinks for computers. We have cooperated with Intel and AMD in developing CPU heat sinks and both companies have certified and recommended our products over others. In addition, reputable computer companies such as IBM, HP, Gateway, NEC, Packard, Compaq, Fujitsu and Siemens approve of our CPU heat sinks. Our product line also includes heat sinks for CPU, chips, hard disks, case fans, system cases, solutions to industrial heat dissipation and other peripherals.

Precautions

When using the Aquagate Liquid Cooling System, please keep the following precautions in mind:

- In countries where 220V AC is the standard power source, please use the provided 220V to 110 AC adapter cable.
- Some computer cases' 5.25" shields have guide rails, which may interfere when inserting the product into two 5.25" slots.
- Do not use unauthorized or unsupported liquid coolants. Failure to comply invalidates the warranty, and Cooler Master is not responsible for any resulting damage due to leakage or short circuits

Parts List

The Aquagate Liquid Cooling System comes with the following components:

- ❑ Liquid Cooling Unit (LCU) (x1)
- ❑ PCI Card (x1)
- ❑ 6.5mm*10mm PU water pipes (x2)
- ❑ Pipe clips (x2)
- ❑ Non-leaking pipe plugs (x2)
- ❑ 110 Volt AC cable (x1)
- ❑ 220 Volt AC cable converter (x1)
- ❑ Water block (x1)
- ❑ Retention mounting screws for socket 478 and 754/940 (x4)
- ❑ Socket 478 water block mounting retention set (x1): retention (x1), spring w/ silver screws (x4)
- ❑ Socket 754/940 water block mounting retention set (x1): retention (x1), spring w/ black screws (x2)
- ❑ LCD mounting bracket (x1) with screws (x4)
- ❑ Substitute block (for LCD module) (x1)
- ❑ Socket 462 clip (x1)
- ❑ Thermal conductivity grease (x1)
- ❑ Cables: D-bus (x1), thermal sensor (x1), shutdown cable (x1), and LCD extension cable (x1), 4-pin power cable (x1)
- ❑ Coolant (x1 bottle)
- ❑ K8 back plate (x1)
- ❑ P4 back plate (x1)
- ❑ Screws (x9)
- ❑ Support pads (x4)
- ❑ Installation guide (x1)
- ❑ Secondary PSU mount (x1)

If any of these components are missing or damaged, please contact the vendor from whom you purchased the Aquagate Liquid Cooling System, or you may contact us directly.

Specifications*

Dimension: 220mm (L) x 148mm (W) x 88mm (H)
Case Material: Aluminum
Fan Dimension: 80x80x25 mm
Fan Speed: 2000 / 3100 / 4600 rpm
Fan Bearing Type: Rifle bearing
Fan Voltage Rating: 12V
Noise Level: 23 / 34 / 49 dB
Power supply: AC power (indoor: 110V and 220V) and DC power (DC 12V)
Pump: 110V, AC 9W
Power consumption: DC 12V, 2.2 W
Water Block Material: Copper and Acrylic
Weight: 2kg (Main Unit) / 5Kg (Total)
Thermal Resistance: RCA 0.31 / 0.25 / 0.23 C/W (tested with the Intel Pentium® 4 at 3.06 GHz)
Application: AMD K7 (socket 462), K8 (socket 754/940) and Intel P4 (socket 478)

* Specifications are subject to change without prior notice

Features

The Aquagate Liquid Cooling System has the following features:

Multi-functional

Aquagate features flexibility in installation. It can be installed either into the ordinary computer case (using two 5.25” drives), a spare PSU bay in the computer case, or used as an external device.

Modular Design

You only need to take the following steps to install the machine: Connect the Aquagate water block to the computer’s CPU; affix the water block to the CPU using the retention and screws attached to it; and connect to the water pipes and other cables to the LCU. Aquagate can be installed on a wide variety of CPU types, such as AMD K7, K8, Intel P4 and others of various specifications.

Low Noise and High Performance

The interactive front panel can control the fan’s speed. Such a design achieves both high performance and low noise. The cooling performance is much better than traditional cooling units. Furthermore, the machine case is made entirely of aluminum for better performance in heat dissipation.

Safety

The coolant fluid is made through nano-technological procedures and uses pure water. When used for long-term circulation in the LCU, it does not corrode pipes or metal, nor does the coolant fluid deteriorate. This ensures safety during the cooling process. Moreover, the easy-to-dismantle connector has built in valves to prevent leaks. The machine’s water temperature, CPU temperature warning, and low watermark warning can all be customized to ensure optimal system safety to meet your every computing need.

Functionality

The LCD on the Aquagate front panel performs real-time system monitoring, giving you the highest level of control and performance.

Aesthetics

Aquagate's unique and eye-catching outline features a pure aluminum case and cool blue-light panel.

Durability

The Aquagate Liquid Cooling System's high quality AC pump ensures its reliability and longevity.

Installation

Cooler Master has made installing the Aquagate Liquid Cooling System as easy and painless a task as possible.

Before you begin installation, however, it is very important to first consider where you want to put the Aquagate LCU. If you install it internally, then you should make certain you have either two spare 5.25" drive bays available to you or a spare PSU bay. Furthermore, with an internal installation you will need to cut the plastic water pipes to the appropriate length, the distance being that from the Aquagate's non-leaking connectors to the water block on the motherboard.

NOTE: Using the Aquagate internally will cause the temperature of your machine to rise slightly.

Furthermore, should you decide to install it externally, then you may still want to trim the pipe lengths provided you leave them long enough to run from the non-leaking connectors down to the PCI card ports, and out to the Aquagate LCU. Finally, the decision to install the LCU internally or externally will significantly influence how the water block installation proceeds; if you choose to install it externally, then you can easily install the water block first, but if you choose an internal option for the LCU then you may want to consider installing it before the water block goes in.

Finally, another consideration – and this is extremely important – is what type of CPU are you going to fit the Aquagate's water block over? The Aquagate Liquid Cooling System supports the following major CPU types: Intel Pentium® 4, AMD K7 (Duron, Athlon, AthlonMP, AthlonXP), and the AMD K8 (Opteron, Athlon64). Each of these three CPUs must be fitted differently for the water block. Pay care attention to the installation procedures to ensure you are installing the device correctly for your specific CPU.

NOTE: Before installing any of the components, turn off and unplug your computer. However, at key points during the installation process you will be required to turn the computer on in order to get the coolant liquid flowing through the pipes.

Installation Flow Chart

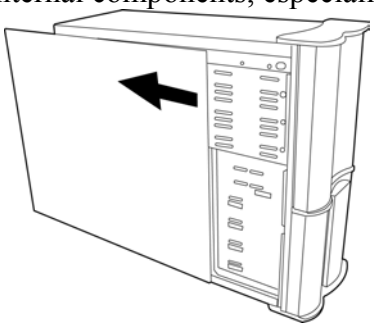
Internal Installation
Shut down the computer.
Install the water block.
Install the PCI card
Fit the water pipes
Connect the cables to the PCI card, the motherboard and the LCU
Connect the water pipes to the LCU and the water block
Add coolant to the LCU
Turn on the computer
Add more coolant to the LCU
Gently rock the LCU to clear air bubbles from tank
Turn off the computer
Install the LCU, disconnecting the wires and pipes if necessary (a few drops of liquid may spill at the removal of the non-leaking connectors; this is normal)
Reconnect the wires and pipes to the LCU
Turn on the computer
Ensure everything works properly

External Installation
Shut down the computer
Position the LCU where you want to house it.
Install the water block.
Install the PCI card
Fit the water pipes
Connect the cables to the PCI card, the motherboard and the LCU
Connect the water pipes to the LCU and water block
Add coolant to the LCU
Turn on the computer
Add more coolant to the LCU
Gently rock the LCU to clear air bubbles from tank
Ensure everything works properly

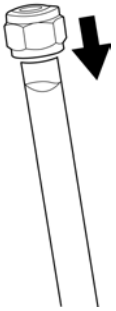
1a. Water Block (Intel Pentium® 4)

To install the water block on an Intel Pentium® 4 CPU:

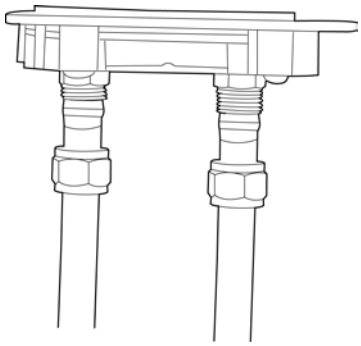
1. Open the side panel that gives you the easiest access to your computer's internal components, especially the motherboard.



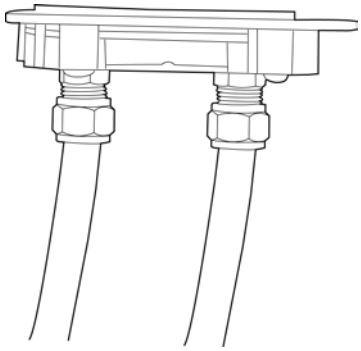
2. Fit two brass screws over the water pipes.



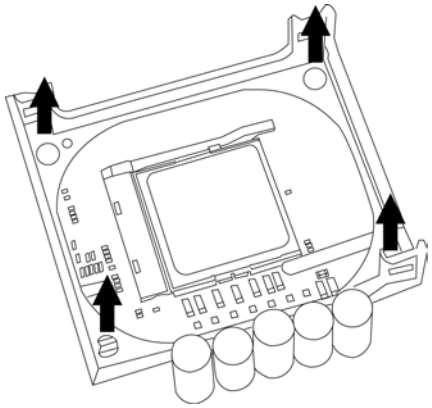
3. Fit the ends of the water pipes with the brass screws into the two pipe connectors on the water block.



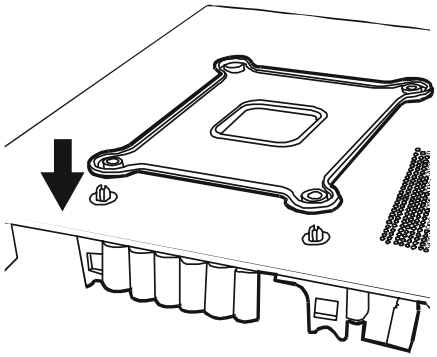
4. Next, secure the brass screws tightly to the pipe connectors, thus ensuring the water pipes will not slip free.



5. On the motherboard, remove the original retention module surrounding the CPU. If necessary, you will need to use a pair of pliers to remove the four pushpins holding it to the motherboard.

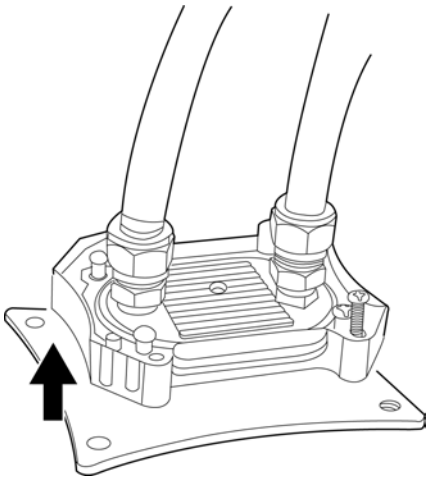


6. Remove the motherboard from the panel, and then secure the back plate behind it and below the CPU socket. Ensure that the insulating board card is first placed between the back plate and the motherboard.

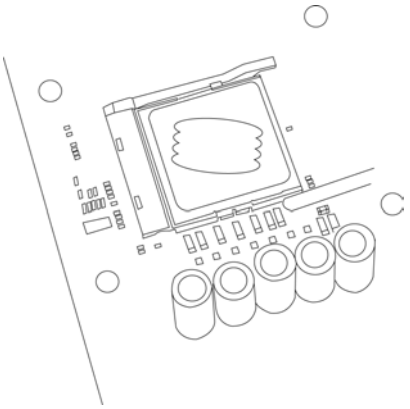


7. Four mounting holes should already be provided into which you may insert the plate's mounting plugs. Remember the direction of the back plate.

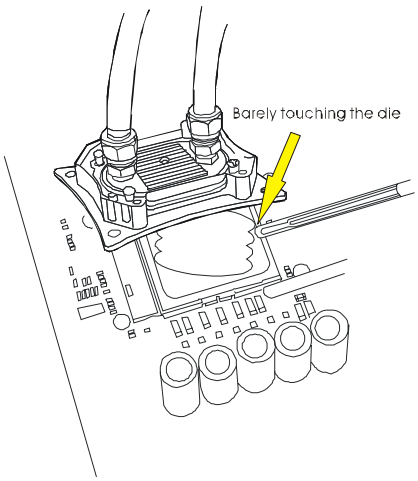
8. Remove the protective film coating the water block, then attach the Aquagate retention plate to it. This replaces the original retention module and must be secured to the water block with four screws.



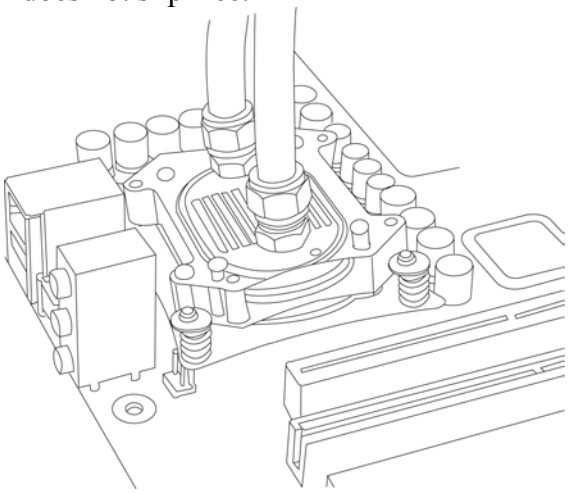
9. Apply thermal grease to the top of the CPU. This is an insulating substance that protects both the water block and the CPU over which it sits.



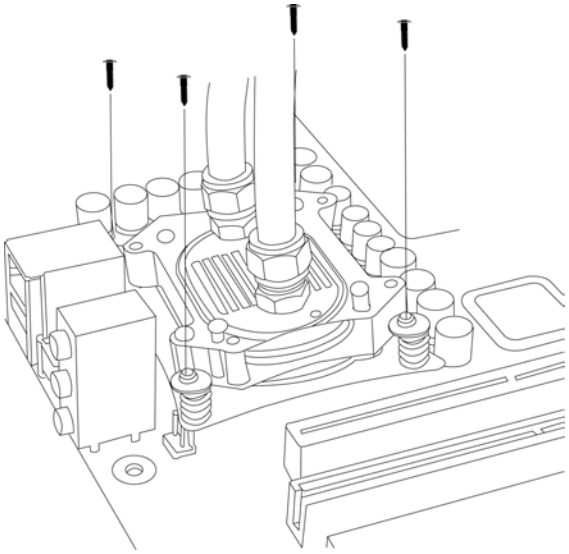
10. Press the end of the thermal sensor cable into the thermal grease. The plug end will later be attached to the PCI card.



11. Carefully position the water block and attached retention plate over the CPU, aligning the corner screw holes with the holes in the motherboard. Ensure that in doing this step the thermal sensor does not slip free.



12. With the four provided spring screws, secure the water block's retention plate to the back plate on the other side of the motherboard through the holes.

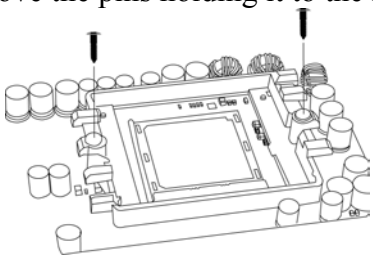


13. Next, install the PCI card (see procedure 2 for details on how to do this) and the Aquagate LCU (see procedure 3 for details on how do this).

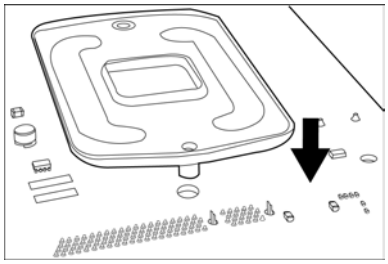
1b. Water Block (AMD K8)

To install the water block on an AMD K8 CPU:

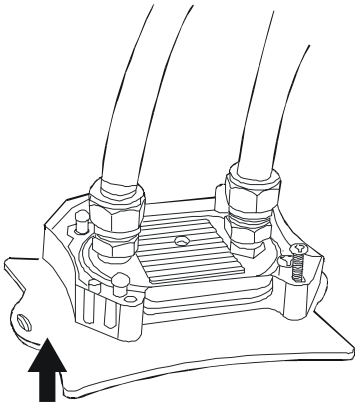
1. Follow steps 1-4 in procedure 1a, above.
2. On the motherboard, remove the original retention module surrounding the CPU socket. You will need to use a pair of pliers to remove the pins holding it to the motherboard.



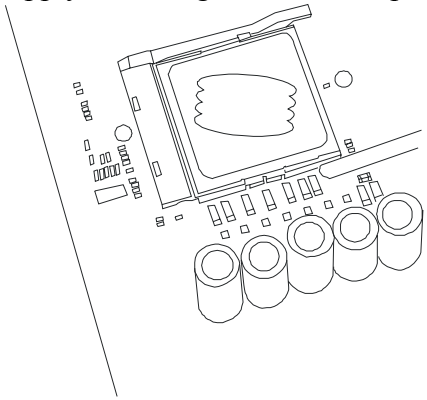
3. Remove the motherboard from the panel, and then secure the back plate behind it and below the CPU. Ensure that the insulating board card is first placed between the back plate and the motherboard.



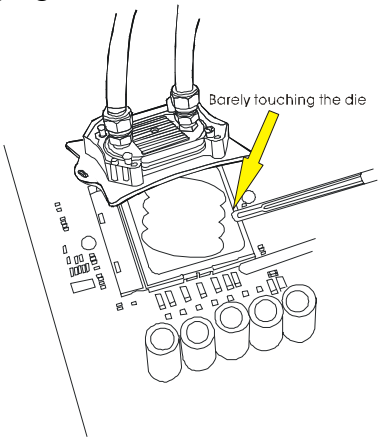
4. Remove the protective film coating the water block, then attach the Aquagate retention plate to it. Attach the Aquagate retention plate to the water block. This must be secured to the water block with 4 screws.



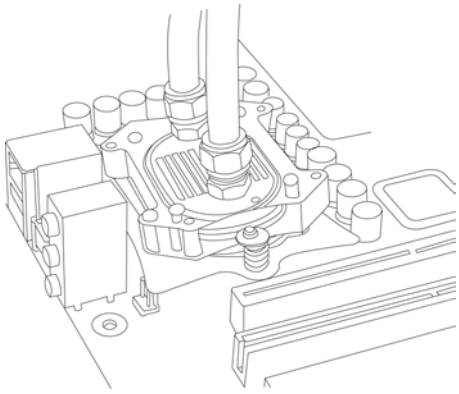
5. Apply thermal grease to the top of the CPU.



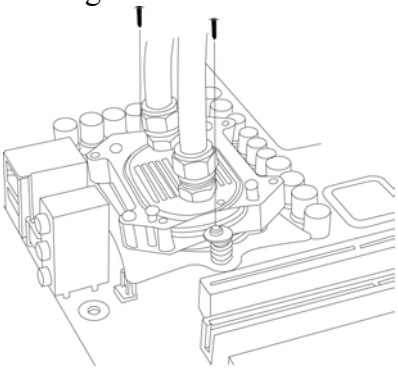
6. Press the end of the thermal sensor cable into the thermal grease. The plug end will later be attached to the PCI card.



7. Carefully position the water block and attached retention plate over the CPU, aligning the corner screw holes with the holes used originally by the retention module. Ensure that in doing this step the thermal sensor does not slip free.



8. With the two provided spring screws, secure the water block's retention plate to the back plate on the other side of the motherboard through the 2 holes.

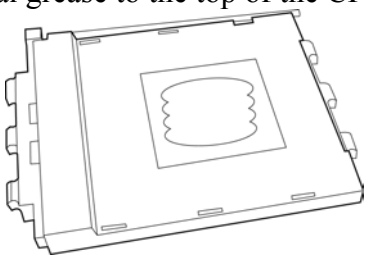


9. Next, install the PCI card (see procedure 2 for details on how to do this) and the Aquagate LCU (see the procedure 3 for details on how do this).

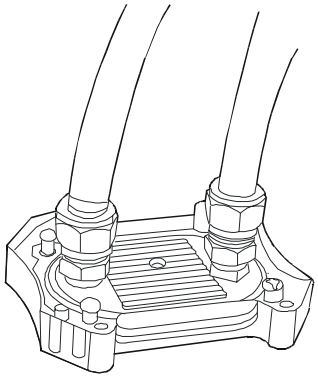
1c. Water Block (AMD K7)

To install the water block on an AMD K7 CPU:

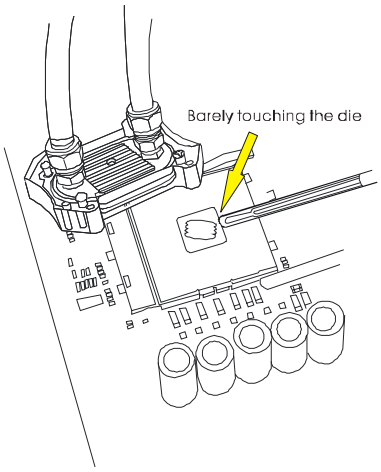
1. Follow steps 1-4 in procedure 1a, above.
2. Apply thermal grease to the top of the CPU.



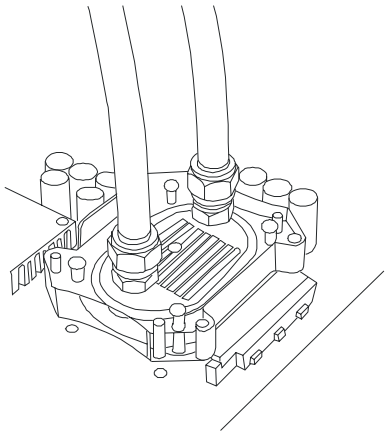
3. Remove the protective film coating the water block.



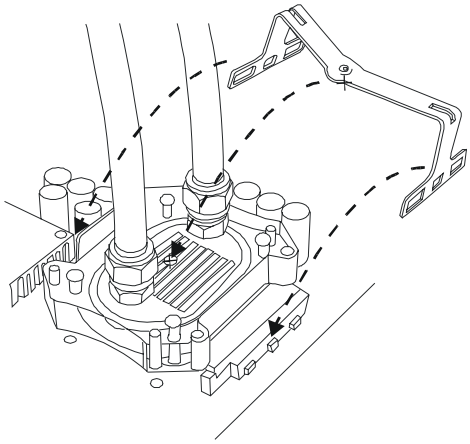
4. Press the end of the thermal sensor cable into the thermal grease. The plug end will later be attached to the PCI card.



5. Carefully position the water block over the CPU. Ensure that in doing this step the thermal sensor does not slip free.



6. With the provided spring clip, secure the water block to the socket's two sides.

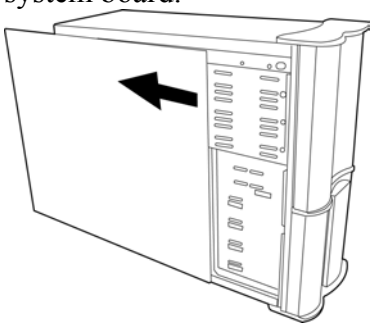


7. Next, install the PCI card (see procedure 2 for details on how to do this) and the Aquagate LCU (see the procedure 3 for details on how do this).

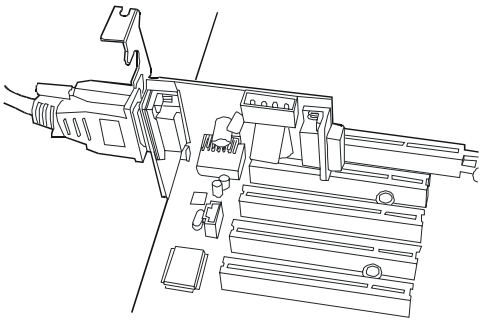
2. PCI Card

To install the PCI card:

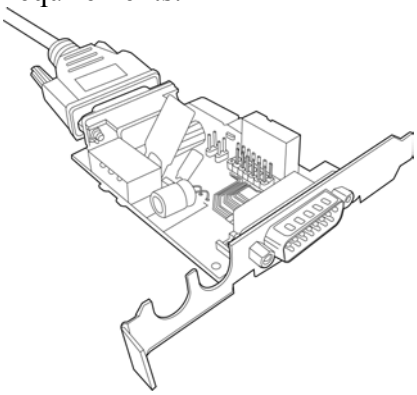
1. Open your computer's side panel to give you unimpeded access to the system board.



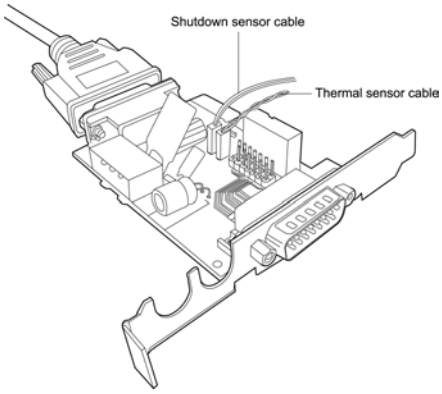
2. Insert the PCI card into a spare PCI slot on the system board, fitting it so that the water pipe ports face outward on the computer chassis.



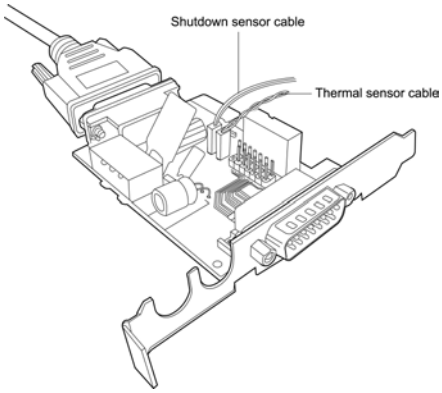
3. Connect one end of the D-bus cable to the PCI card. Two D-bus ports are provided, one for an internal installation and one for an external installation. Choose the one that suits your installation requirements.



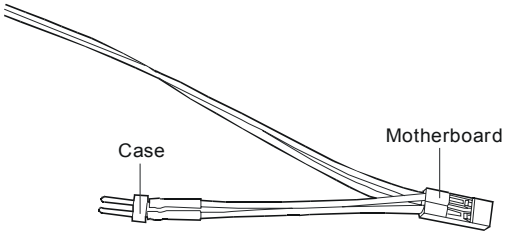
4. Connect the thermal sensor cable plug to the PCI card.



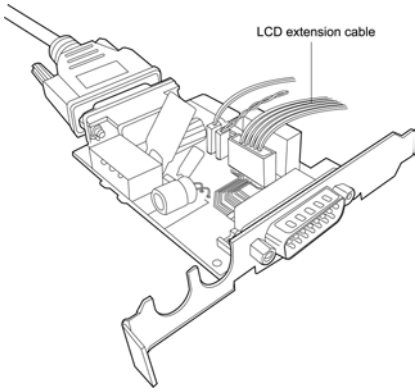
5. Connect the shutdown sensor cable to the PCI card.



6. Connect the shutdown sensor cable's remaining Y-branch to the motherboard and to the computer case's shut down switch.



7. If you intend to put the Aquagate LCU outside the computer, you may need to connect the LCD extension cable to the PCI card if you put the LCD module in one of your computer's spare 5.25" drive bays (see procedure 4).

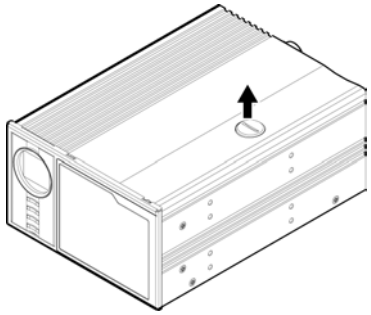

LCD extension cable

3a. Installing the LCU (Internal)

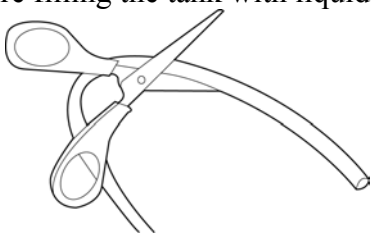
The following procedure is to prepare the LCU for internal installation. For an external installation, please skip to step 3b.

To prepare the LCU for installation:

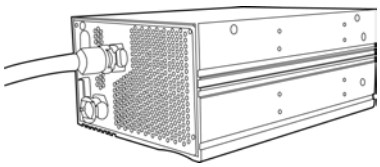
1. Open the coolant valve on the top of the Aquagate LCU assembly with a coin or a broad screwdriver.



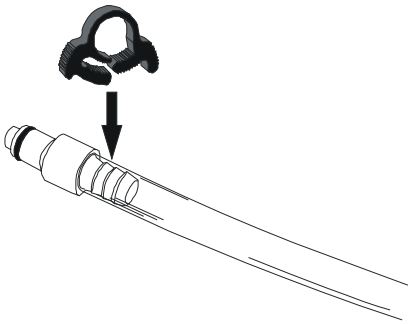
2. Decide the location in which you want to install then LCU, then figure out the length the pipes will need to be in order to run from the water block on the CPU to the LCU. This must be done before filling the tank with liquid coolant.



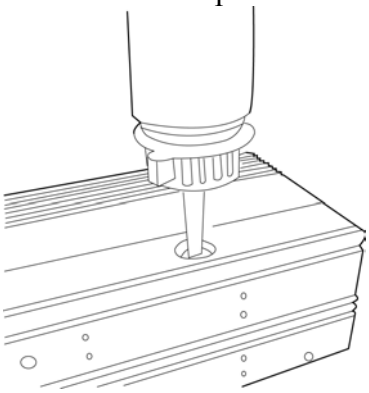
3. Fit the non-leaking plugs into the free ends of the water pipes. (Place the LCU near the side panel of chassis to make it easier.) Next, connect them to the non-leaking pipe connectors at the back of the Aquagate LCU.



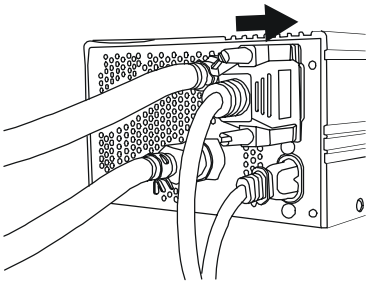
4. Secure the pipe clip tightly around the neck where the non-leaking plug mates with the water pipe.



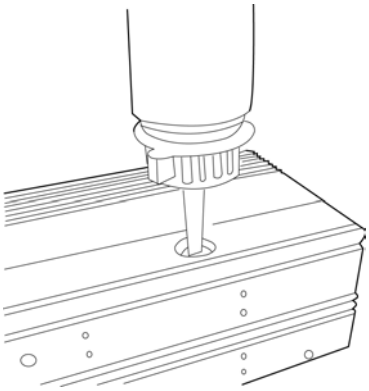
5. Fill the coolant tank until it tops out.



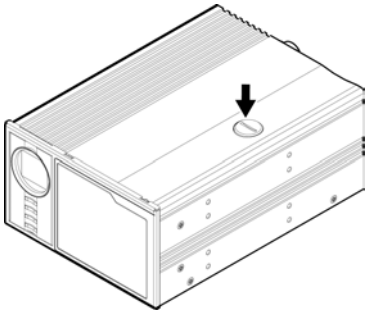
6. Connect the D-bus cable to the LCU and then plug in the LCU's power cable. Be sure to use the proper cord for your region (either the 220V or the 110V).



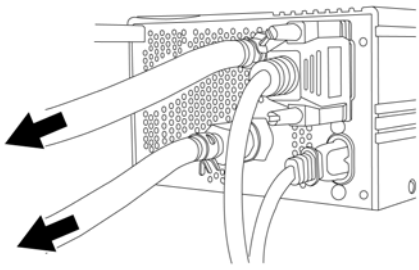
7. Turn on the computer to get the coolant flowing through it. As the LCU runs, the level in the tank will decrease naturally as it flows into the water pipes.
8. Gradually add more coolant to the tank until it tops out again.



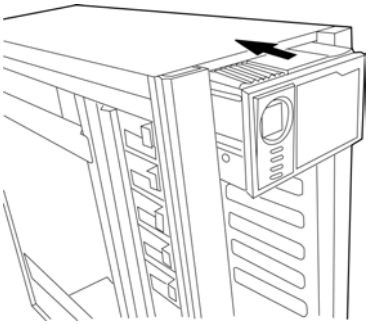
9. Gently tilt the LCU in each of the cardinal directions for approximately 10 to 15 seconds in order to clear any air bubbles from the coolant and pipes. After you have done this, let the LCU sit on a level surface for about 5 minutes.
10. Close the coolant valve.



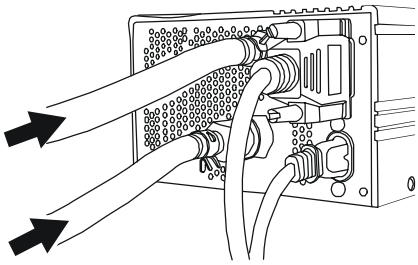
11. Shut down the LCU by turning off the computer.
12. Remove the protective panels from the two available drive bays you intend to use for the LCU. These two bays must be stacked consecutively.
13. Detach the non-leaking plugs, then connected water pipes, and any other cables from the LCU. Water pipes can be detached by pressing the silver switches on the LCU's non-leaking connector ports.



14. Fit the Aquagate LCU into the double drive bays, and secure it with four screws to a side.



15. Attach the non-leaking plugs to the LCU's non-leaking connectors and then reattach the cables.

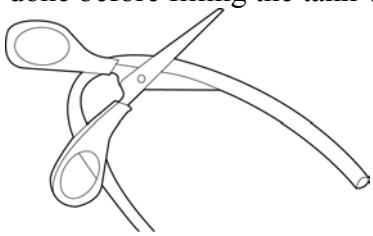


NOTE: You can also put the LCU into one of the PSU bays if more than one is provided in your computer case.

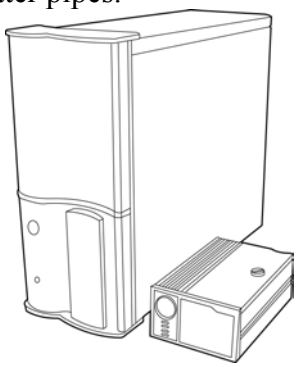
3b. Installing the LCU (External)

To install the LCU externally:

1. Before you begin, be sure that you have cut the water pipes to match the distance between the LCU and the water block. This must be done before filling the tank with liquid coolant.



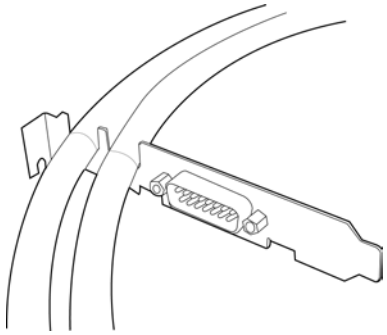
2. Position the Aquagate LCU near the computer inside of which the water block and PCI card have been installed. It should not be further away from the computer than the maximum length of the water pipes.



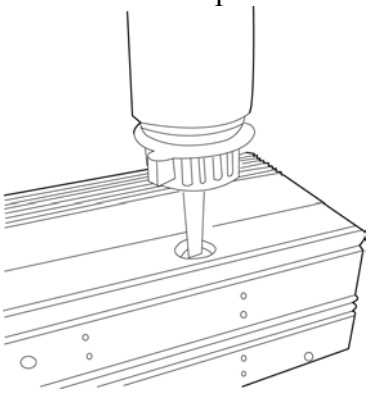
3. Thread the water pipes through the PCI bezel (while the PCI bezel remains detached from the chassis).

   Fit the non-leaking plugs into the free ends of the water pipes.

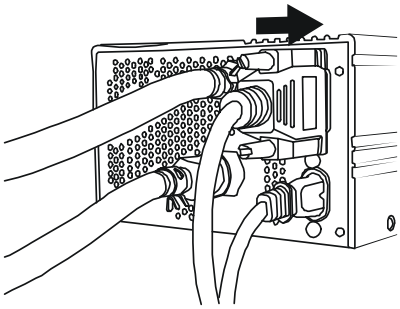
   Secure the pipe clip tightly around the neck where the non-leaking plug mates with the water pipe.



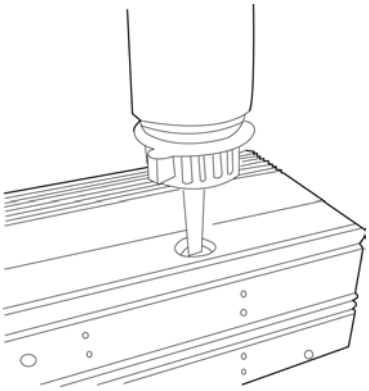
4. Add the support pads to the underside of the LCU.
5. Fill the coolant tank until it tops out.



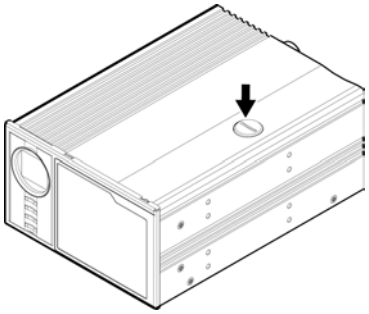
6. Connect the D-bus cable to the LCU and then plug in the LCU's power cable. Be sure to use the proper cord for your region (either the 200V or the 110V).



7. Turn on the computer to get the coolant flowing through it. As the LCU runs, the level in the tank will decrease naturally as it flows into the water pipes.
8. Gradually add more coolant to the tank until it tops out again.



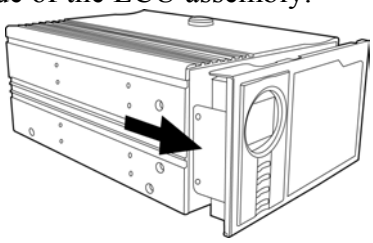
9. Gently tilt the LCU in each of the cardinal directions for approximately 10 to 15 seconds in order to clear any air bubbles from the coolant and pipes. After you have done this, let the LCU sit on a level surface for about 5 minutes.
10. Close the coolant valve.



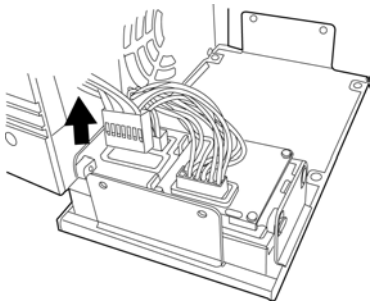
4. Installing the LCD

To install the LCD in a drive bay separate from the LCU:

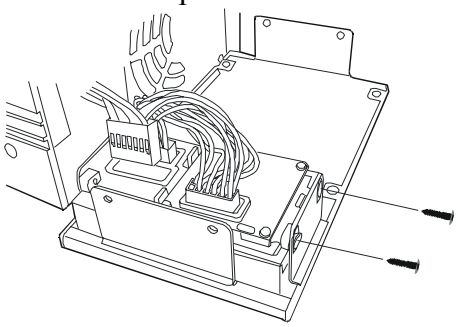
1. Free up an empty drive bay on your computer case by removing the screws securing its protective panel and then removing the panel.
2. Detach the LCD panel from the LCU by removing 2 screws from each side of the LCU assembly.



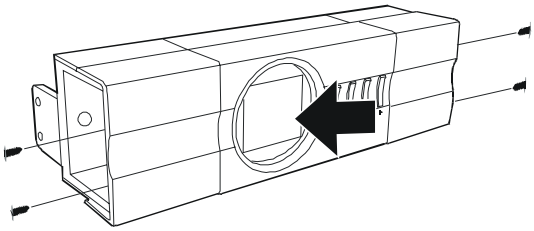
3. Disconnect the black cable that connects the LCD module to the LCU box.



4. Detach the LCD module from the LCD panel by removing 2 screws from both the top and bottom.



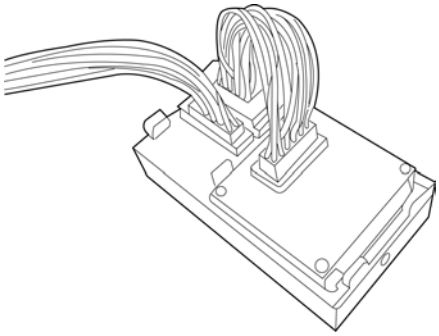
5. Replace the LCD module in the LCD panel with the substitute block (or “dummy module”). This fills the gap left by the now-removed LCD module and keeps the LCU from accumulating debris.
6. Install the LCD module into the stand-alone LCD mounting bracket using four screws.



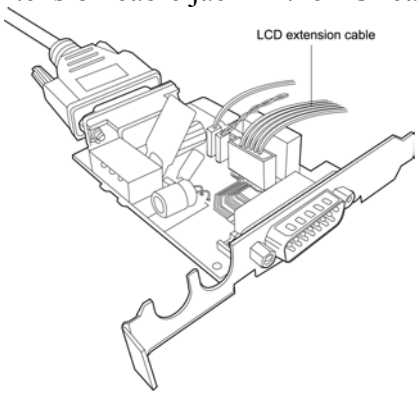
NOTE: You may have to rotate the LCD module in order to get the display characters properly oriented visually.

Furthermore, pay extra attention to the orientation of LCD module's wires. If you are not careful, the wires could get twisted up and cause problems.

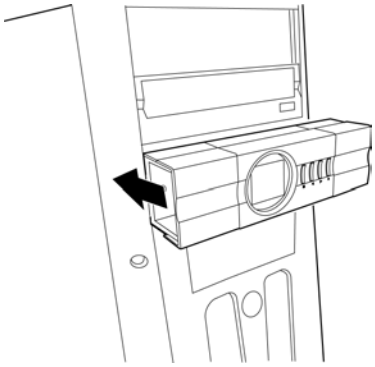
7. Connect the LCD extension cable into the back of the LCD module.



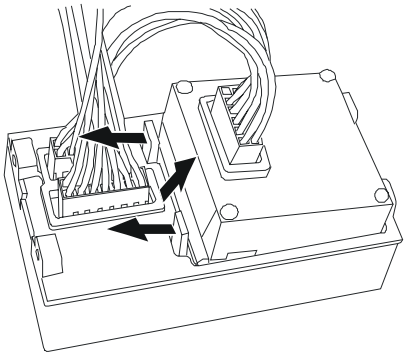
8. Connect the free end of the LCD extension cable to the LCD module's extension cable jack in the PCI card.



9. Install the LCD mounting bracket into a free 5.25" drive bay, securing it in place with the previously removed screws that held the case's protective panel in place.

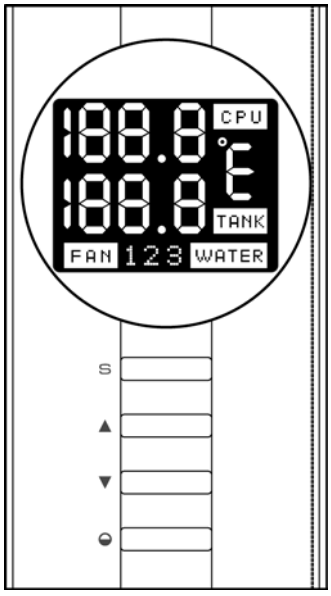


NOTE: If you find the numbers on the LCD are upside, simply rotate the mounting bracket and reinstall it in the drive bay.



Using the LCD

The Aquagate Liquid Cooling System has a built-in LCD module that allows you to monitor coolant temperature and the computer's CPU as well as the cooling system's fan speed.



You can set an alarm on the cooling system to notify you if the CPU or the tank coolant rises higher than a specified temperature, if the tank coolant falls lower than the tank sensor, or the LCU fan fails.

When the alarm goes off, the LCD on the cooling system flashes and beeps. If you do not take any action for 30 seconds (default), it automatically shuts down the computer. The LCD also shows where the overheating occurred by flashing the appropriate icon.

The LCD has four Function buttons. They are as follows:

- Set temperature, fan speed and shut down time. Press this button multiple times in order to select different items. If you do not make a selection for 5 seconds, the LCD times out.

- Increases the value of the selected parameter.

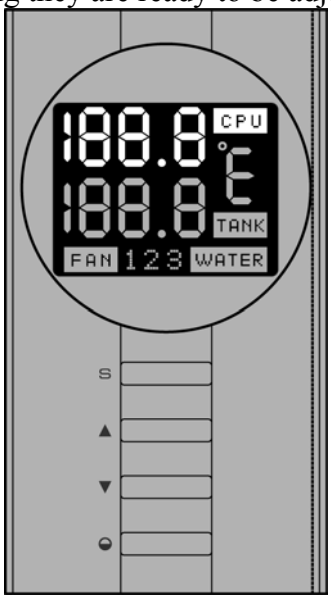
- Decreases the value of the selected parameter.

- Changes the display from degrees Celsius to degrees Fahrenheit, and vice versa.

Setting the CPU Alarm Temperature

To set your optimal CPU temperature:

1. Press the first Function button. The CPU temperature values flash, indicating they are ready to be adjusted.

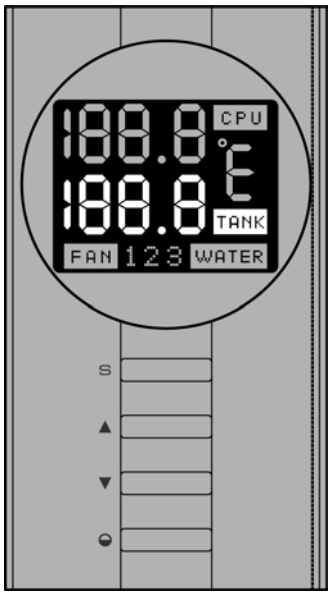


2. Use either the Increase or Decrease Function buttons to adjust the optimal CPU temperature appropriately.
3. When the temperature has been set to your satisfaction, press the first Function button again to confirm. If you take no action, the input settings will be set automatically after 5 seconds.

Setting the Coolant Tank Alarm Temperature

To set the optimal coolant tank temperature:

1. Press the first Function button twice. The coolant tank temperature values flash, indicating they are ready to be adjusted.

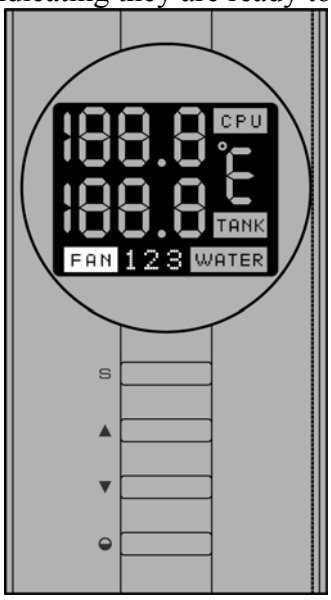


2. Use either the Increase or Decrease Function buttons to adjust the optimal coolant tank temperature appropriately.
3. When the coolant tank temperature has been set to your satisfaction, press the first Function button again to confirm. If you take no action, the input settings will be set automatically after 5 seconds.

Setting the Fan Speed

To set the optimal fan speed:

1. Press the first Function button three times. The fan speed values flash, indicating they are ready to be adjusted.



2. Use either the Increase or Decrease Function buttons to adjust the optimal fan speed appropriately. There are 3 speeds: ‘1’ is the slowest and ‘3’ is the fastest.
3. When the fan speed has been set to your satisfaction, press the first Function button again to confirm. If you take no action, the input settings will be set automatically after 5 seconds.

Setting the Shut Down Time

To set the shut down time:

1. Press the first Function button four times. The screen clears, displaying the shut down time values. They flash, indicating they are ready to be adjusted.
2. Use either the Increase or Decrease Function buttons to adjust the shut down time appropriately.
3. When the shut down time has been set to your satisfaction, press the first Function button again to confirm. If you take no action, the input settings will be set automatically after 5 seconds.

NOTE: The default shutdown time is 30 seconds. You can set the time for any range between 0 and 100 seconds.

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